US 20220048581A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2022/0048581 A1**

Ma (43) **Pub. Date: Feb. 17, 2022**

(54) **SLIDING TAILGATE**

(71) Applicants: **Hyundai Motor Company**, Seoul (KR); **Kia Motors Corporation**, Seoul (KR)

(72) Inventor: **Dong Hee Ma**, Hwaseong-si (KR)

(21) Appl. No.: **17/151,486**

(22) Filed: **Jan. 18, 2021**

(30) **Foreign Application Priority Data**

Aug. 11, 2020 (KR) 10-2020-0100248

Publication Classification

(51) **Int. Cl.**

B62D 33/027	(2006.01)
B62D 33/03	(2006.01)
B60J 5/12	(2006.01)

(52) **U.S. Cl.**

CPC ***B62D 33/0276*** (2013.01); ***B60J 5/12*** (2013.01); ***B62D 33/03*** (2013.01)

(57) **ABSTRACT**

A sliding tailgate includes a moving main body configured to be located on at least a portion of a rear surface of a vehicle, roof levers located at both side ends of a front portion of the moving main body and configured to be moved along roof rail units, tilting units configured to rotate the roof levers thereabout so as to tilt the front portion of the moving main body, rail units configured to be located on a vehicle body and coupled to roller units located at a rear end of the moving main body so as to provide a moving trajectory of the rear end of the moving main body, drive units located on the moving main body and configured to apply driving force to the roller units, and a controller configured to receive a request for opening the moving main body.

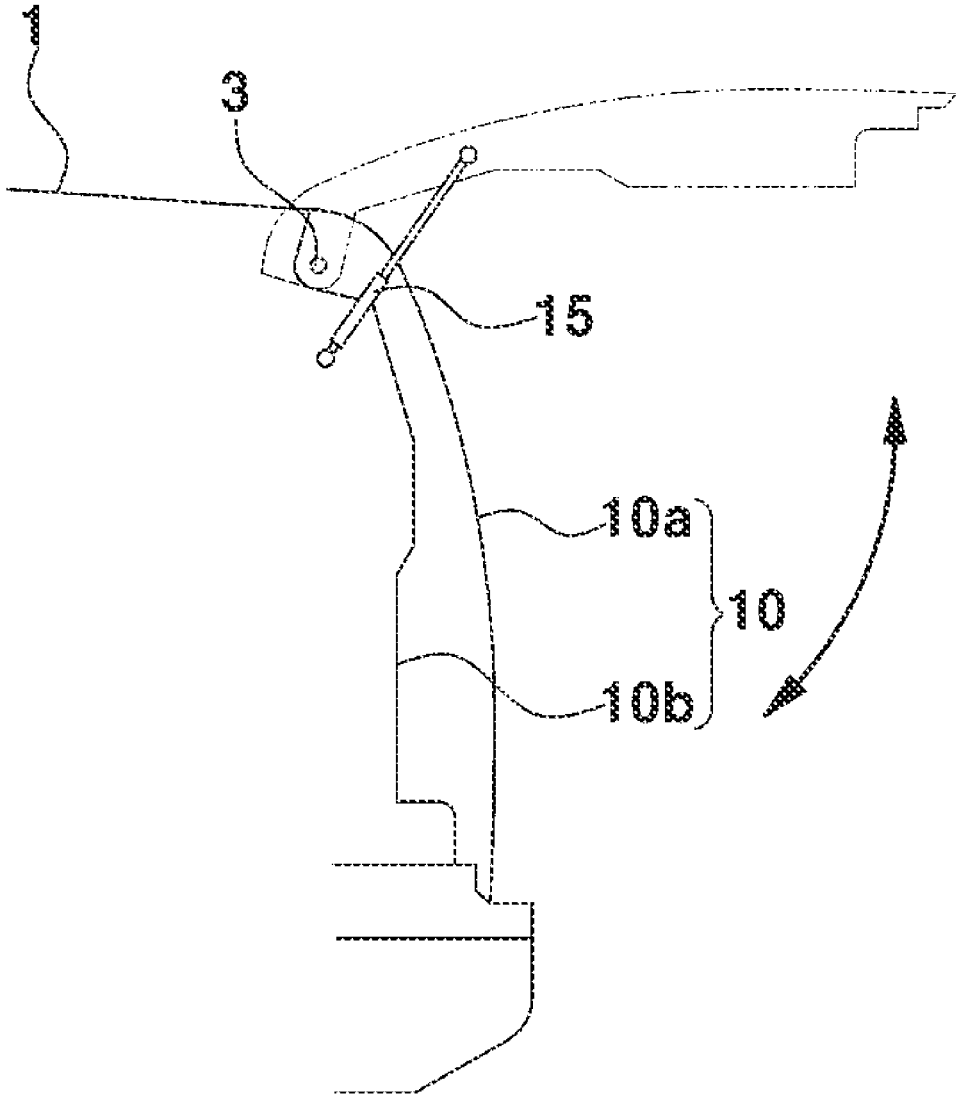


FIG. 1

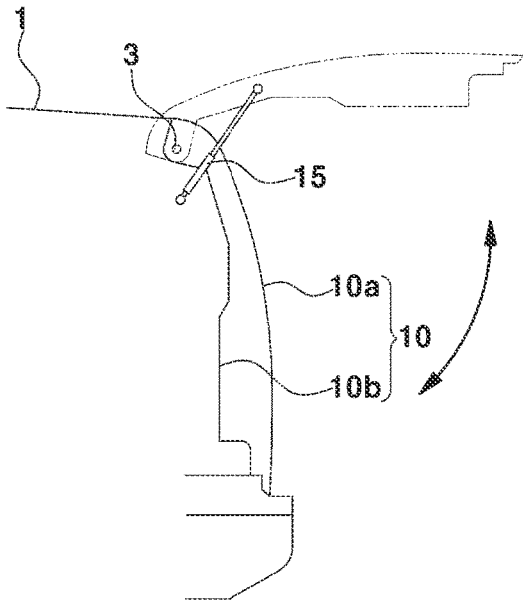


FIG. 2

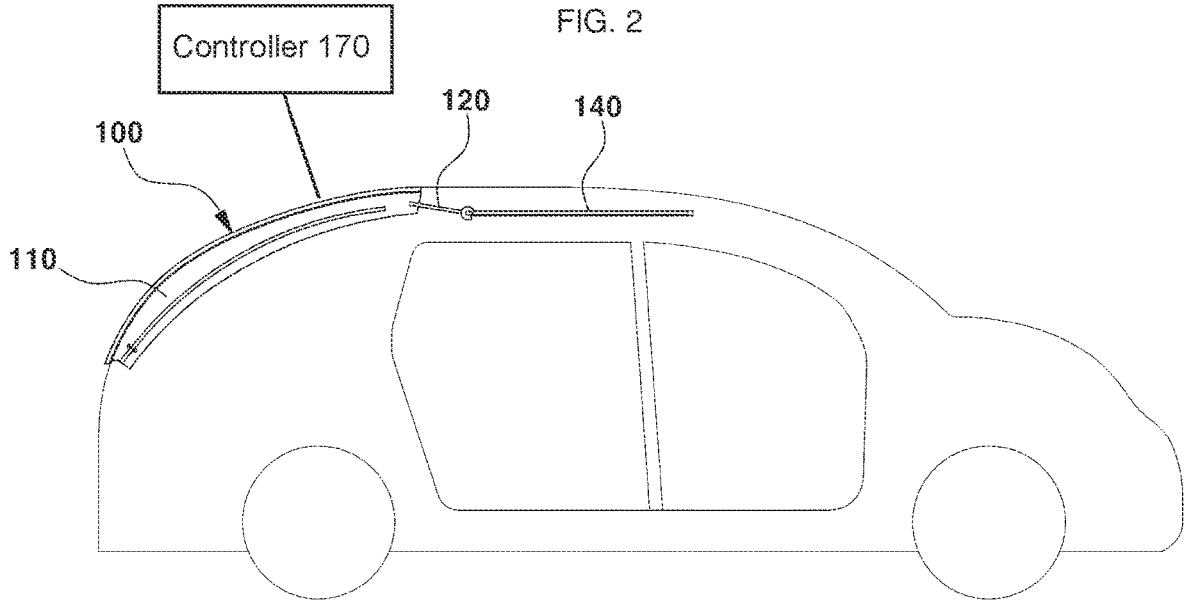


FIG. 3A

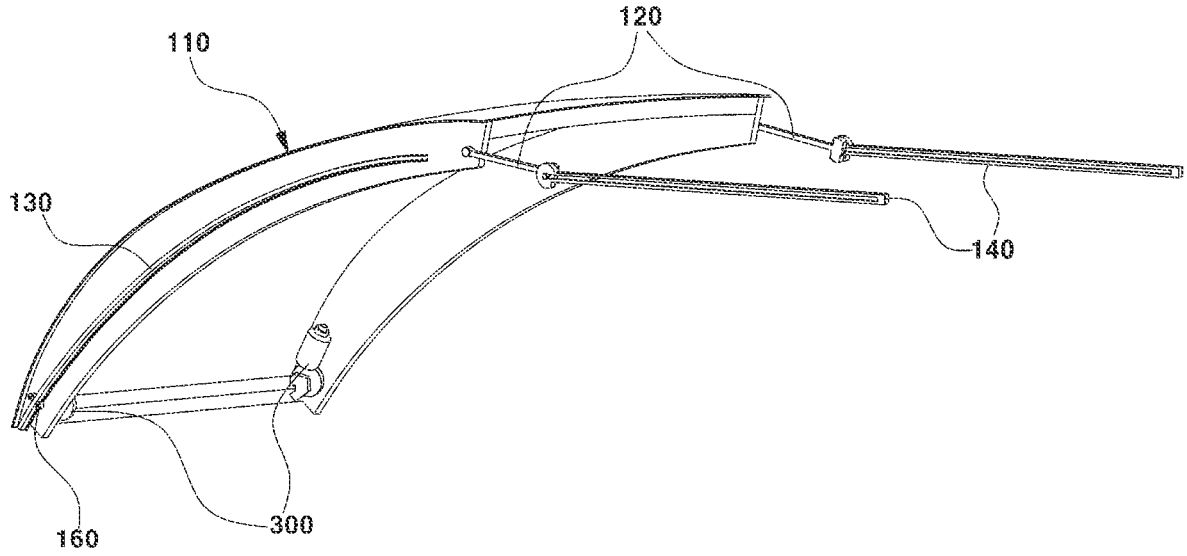


FIG. 3B

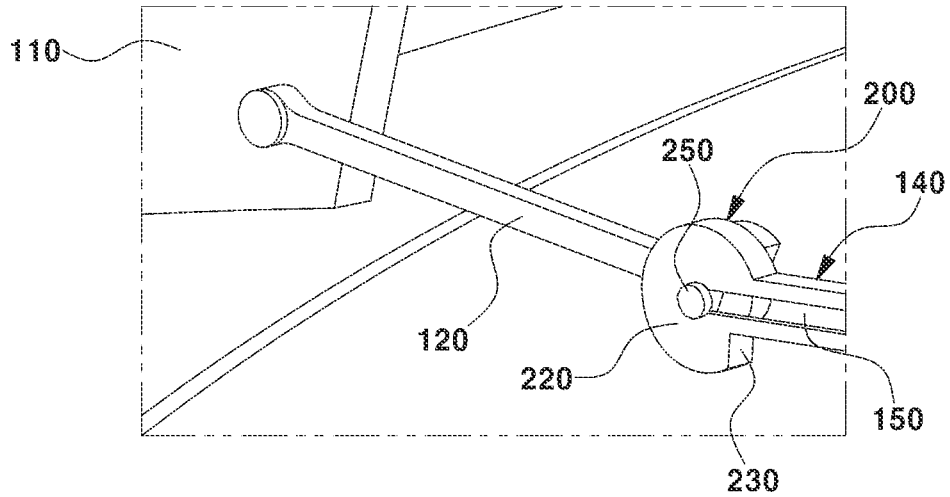


FIG. 3C

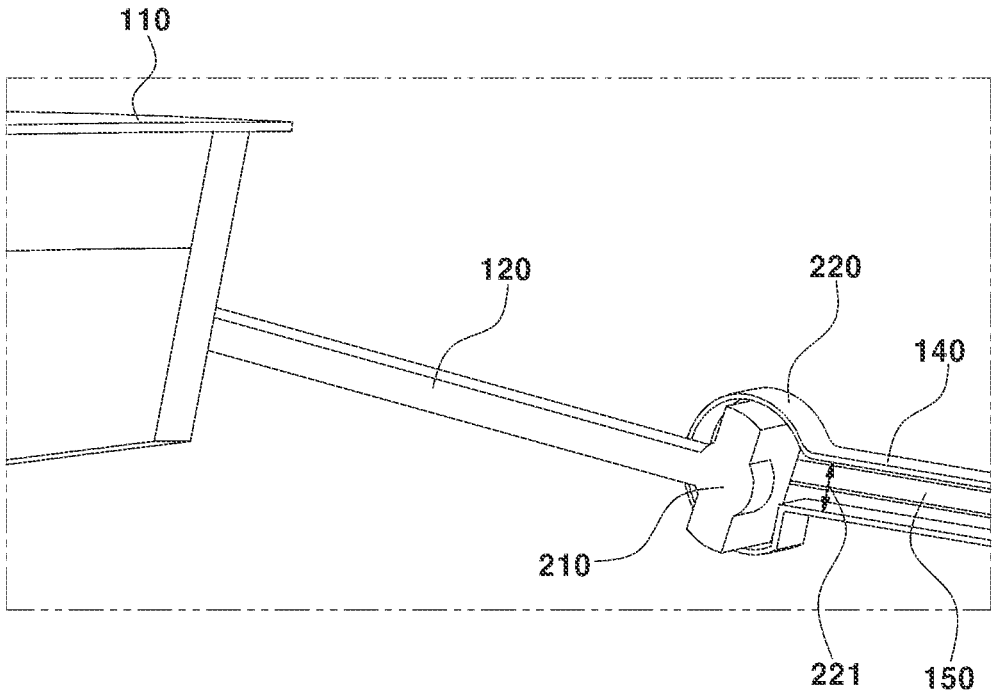


FIG. 4

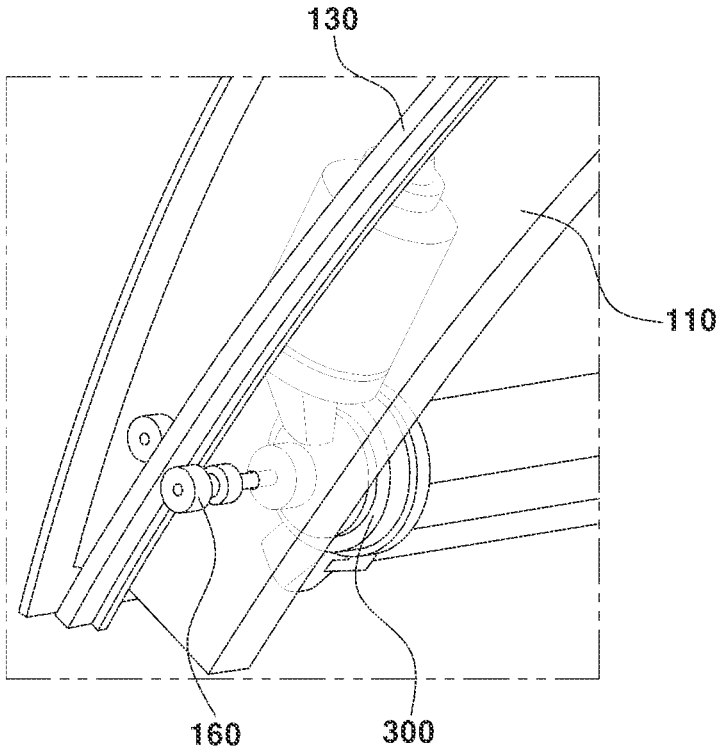


FIG. 5A

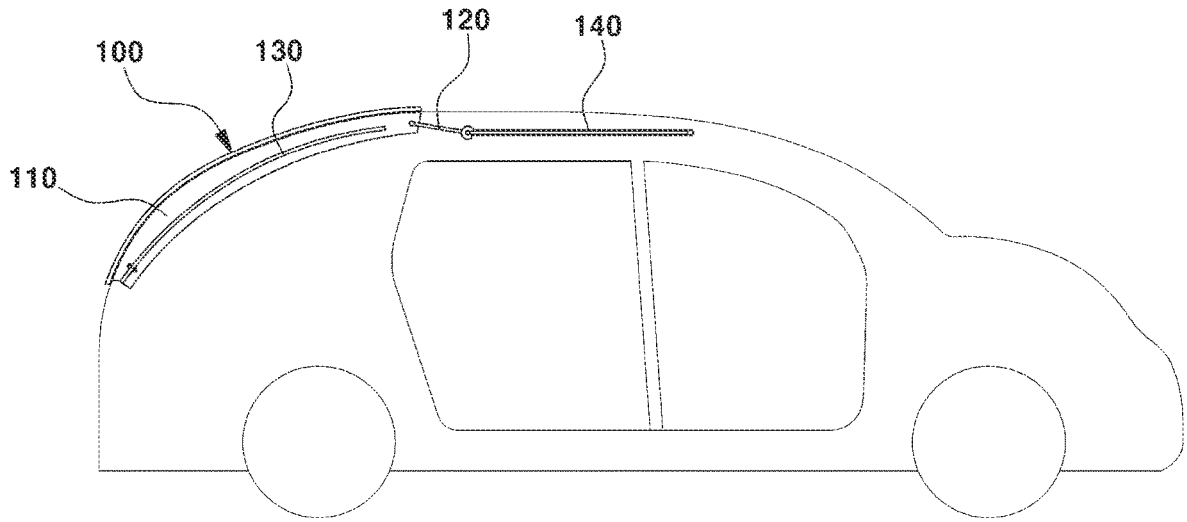


FIG. 5B

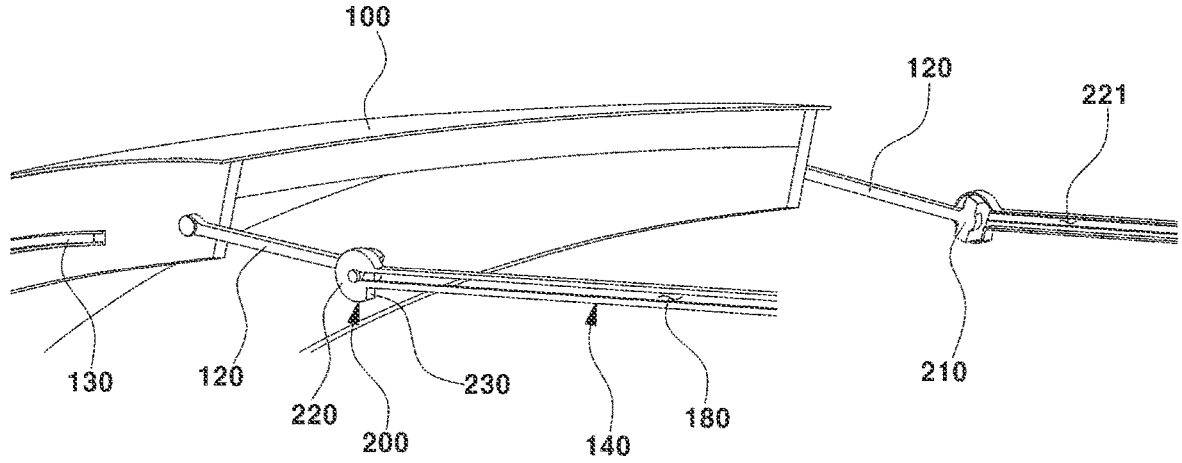


FIG. 5C

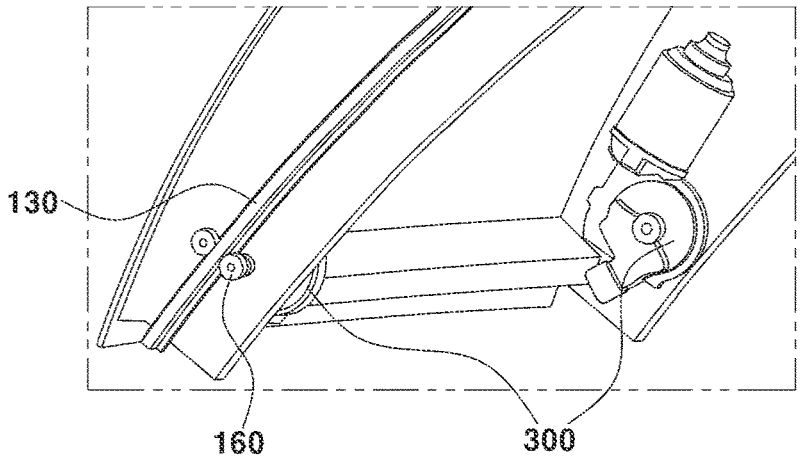


FIG. 6A

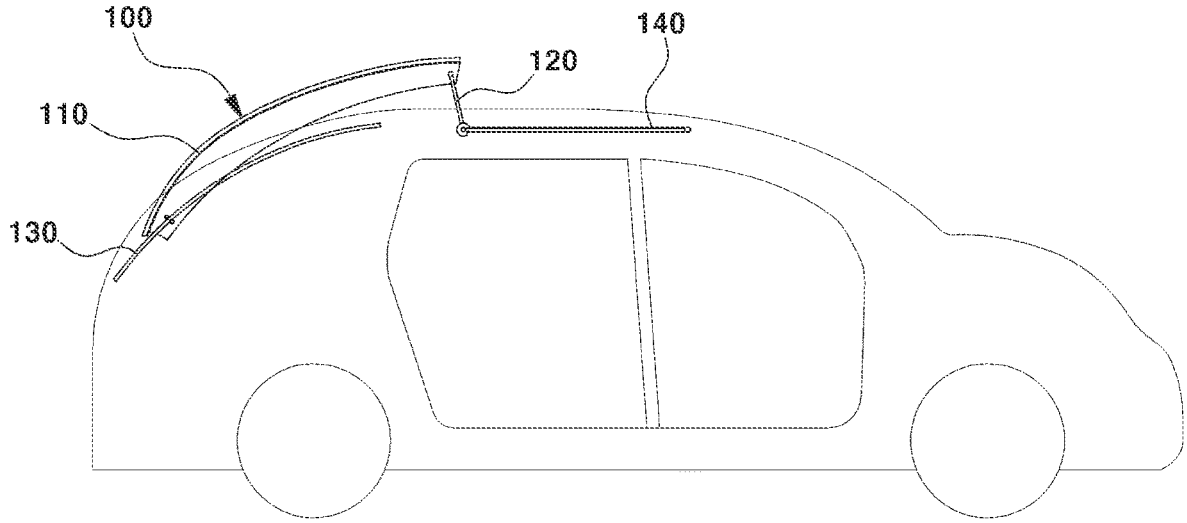


FIG. 6B

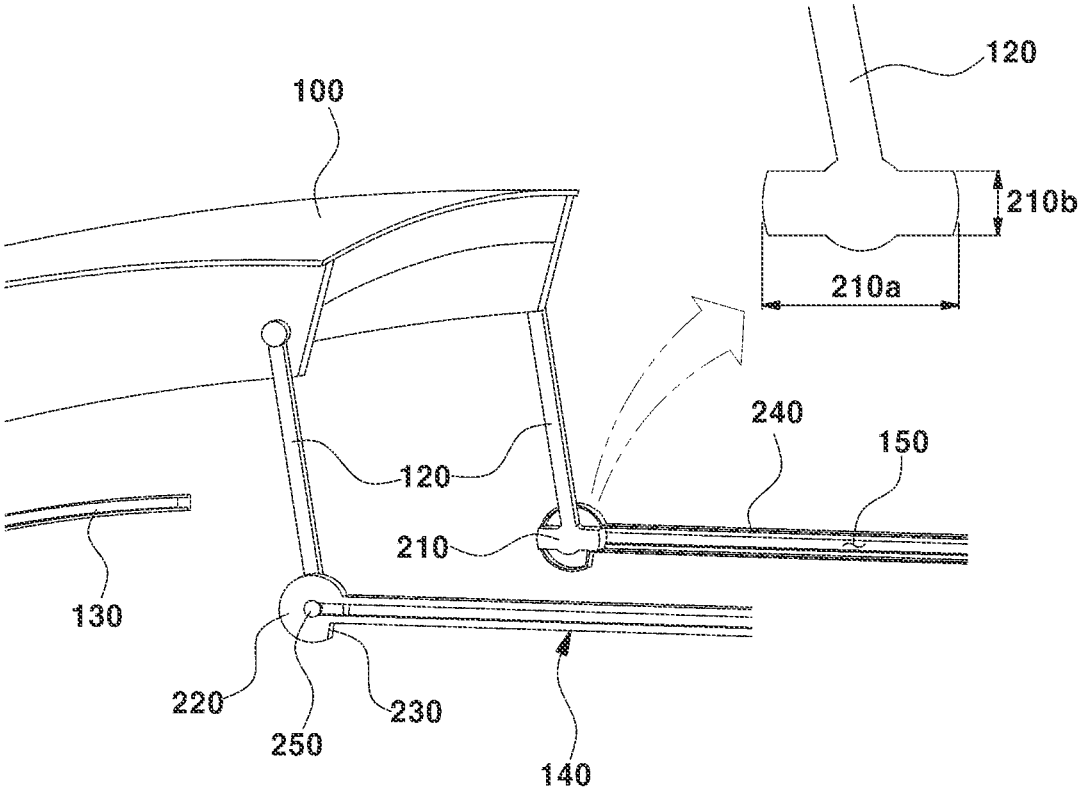

120
100
210b
210a
240
150
120
210
130
220
250
230
140

FIG. 6C

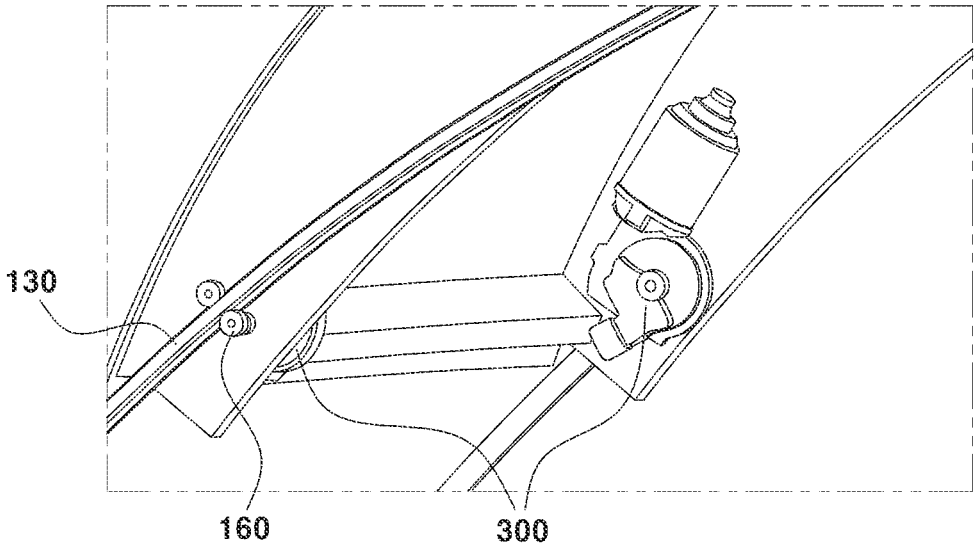

130
160
300

FIG. 7A

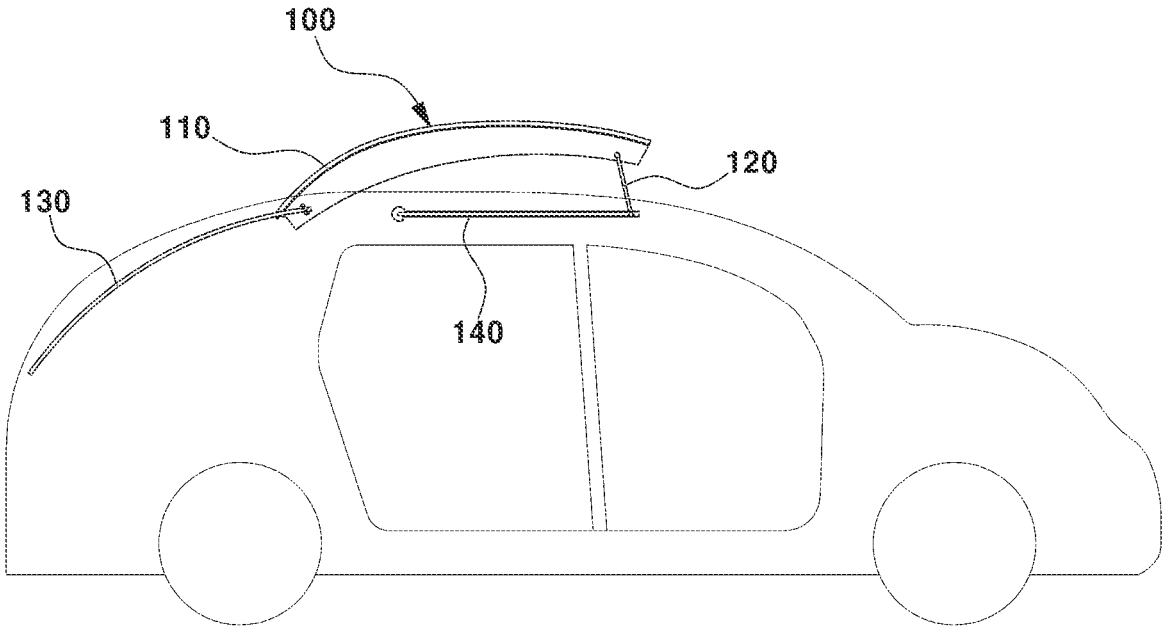


FIG. 7B

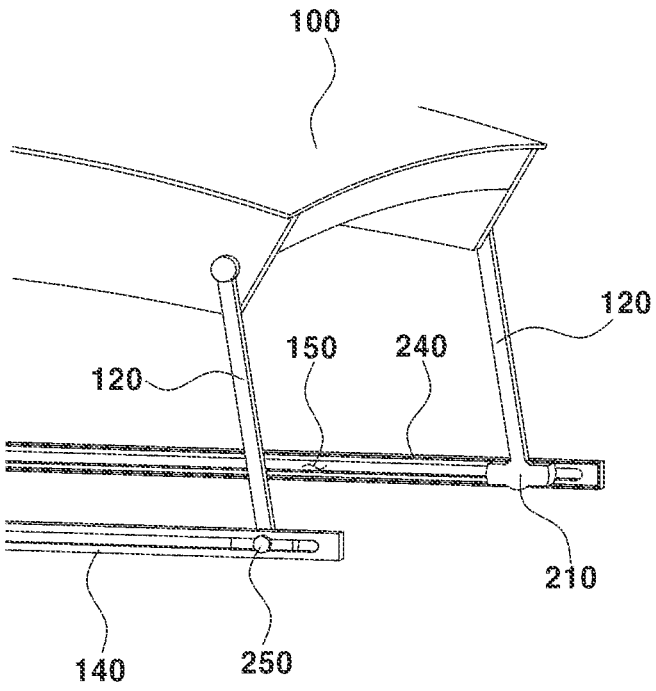
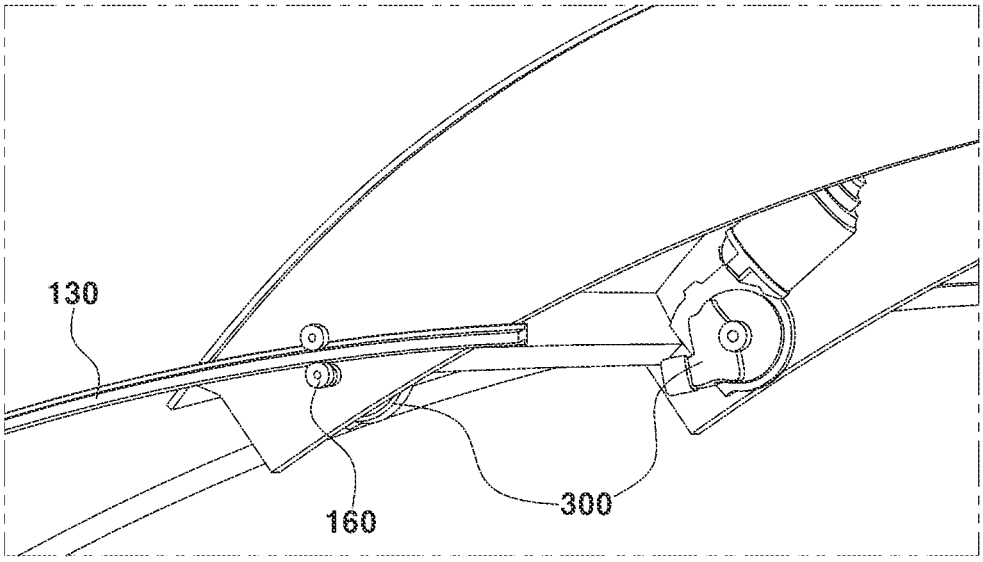


FIG. 7C



SLIDING TAILGATE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Korean Patent Application No. 10-2020-0100248, filed on Aug. 11, 2020, which application is hereby incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure relates to a sliding tailgate.

BACKGROUND

[0003] In general, recreational vehicles (RVs) or sport utility vehicles (SUVs) refer to vehicles which are used as a transportation means for commuting in normal times and are used as a leisure means which is useful for a driver to spend time with his/her family on the weekend. In most of these multi-purpose vehicles, seats are arranged in three rows. A tailgate serving as a door such that persons and cargo may enter and exit the interior of the vehicle therethrough is mounted behind the third seat.

[0004] According to recent vehicle demand trends, most vehicles which are sold are RVs having increased economic feasibility and activity, and consumers are requesting multi-purpose vehicles, such as RVs, which are practical and provide various comforts. In these vehicles, referred to as RVs or SUVs, a tailgate configured to open and close the rear portion of the vehicle is provided so as to increase convenience.

[0005] As shown in FIG. **1**, a conventional upwards uni-directional opening and closing-type tailgate **10** is opened upwards at a right angle by way of a hinge **3** of a rear roof panel **1** when external force is applied thereto with the hands. The tailgate **10** includes an exterior facing side boa and an interior facing side **10***b*.

[0006] Further, one end of a gas lift **15**, which facilitates lifting of the tailgate **10** through rotation and maintains the opened state of the tailgate even when the external force is removed after lifting of the tailgate **10** is completed, is coupled to a concave portion of the tailgate **10** and the other end of the gas lift **15** is coupled to the rear portion of a vehicle body.

[0007] In order to close the tailgate **10**, when external force is again applied to the tailgate **10** with the hands, the tailgate **10** is closed downwards against the gas pressure of the gas lift **15**.

[0008] However, the above conventional upwards unidirectional opening and closing-type tailgate **10** is inconvenient when loading or unloading cargo into or from the vehicle, and particularly, if an obstacle is present behind the vehicle, the opening angle of the tailgate **10** may not be ensured depending on the radius of rotation of the tailgate **10** at the right angle, and thus the position of the vehicle must be changed.

[0009] The above-described tailgate **10** for vehicles has an integrated structure in which the entire tailgate lo is rotated at the same angle by one hinge, and thus, when the space behind the parked vehicle is insufficient, the tailgate **10** is not capable of being opened and closed. Further, a distance between a hinge portion and the end of the tailgate **10** is long, and thus, a large rotating force is required and it takes a lot of power to open and close the tailgate **10**, and moreover, a bent portion of the tailgate **10** is inconvenient when loading cargo into the vehicle.

[0010] Korean Patent Application No. 2010-0071946 provides information relevant to the subject matter described herein.

SUMMARY

[0011] The present disclosure relates to a sliding tailgate. Particular embodiments relate to a sliding tailgate which is configured such that a moving main body thereof is opened in a sliding manner and thus does not require a radius of rotation.

[0012] Embodiments of the present invention can solve problems associated with the prior art, and an embodiment of the present invention provides a sliding tailgate which may be opened in a sliding manner.

[0013] Another embodiment of the present invention provides a sliding tailgate which may be slid towards the upper end of a roof without interference between the roof and a moving main body.

[0014] One embodiment of the present invention provides a sliding tailgate including a moving main body located on at least a portion of a rear surface of a vehicle, roof levers located at both side ends of a front portion of the moving main body and configured to be moved along roof rail units, tilting units configured to rotate the roof levers thereabout so as to tilt the front portion of the moving main body, rail units located on a vehicle body and coupled to roller units located at a rear end of the moving main body so as to provide a moving trajectory of the rear end of the moving main body, drive units located on the moving main body and configured to apply driving force to the roller units, and a controller configured to receive a request for opening the moving main body and to control the drive units to apply the driving force to the roller units.

[0015] In a preferred embodiment, each of the tilting units may include a guide part located at one end of a corresponding one of the roof levers and configured to be inserted into a corresponding one of the roof rails, a rotation guide part configured to surround at least a portion of an outer surface of the guide part so that the guide part is rotated integrally with the corresponding one of the roof levers, and a deployment part configured such that the guide part is rotated to a position corresponding to the corresponding one of the roof rail units, is inserted into the corresponding one of the roof rail units, and is then moved along the corresponding one of the roof rail units.

[0016] In another preferred embodiment, the guide part may include a central shaft configured to pass through the rotation guide part, and the central shaft may be configured to be moved integrally with the guide part along a groove located parallel to the deployment part in the corresponding one of the roof rail units.

[0017] In still another preferred embodiment, the rotation guide part may include a rotation regulation part configured to allow the guide part to be rotated to a position parallel to the deployment part.

[0018] In yet another preferred embodiment, when the driving force of the drive units is applied and thus the rear end of the moving main body is moved along the rail units, a front end of the moving main body may be tilted by rotation of the roof levers about the tilting units.

[0019] In still yet another preferred embodiment, after the front end of the moving main body is tilted, the roof levers may be moved along the roof rail units.

[0020] Other aspects and preferred embodiments of the invention are discussed infra.

[0021] The above and other features of embodiments of the invention are discussed infra.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The above and other features of embodiments of the present invention will now be described in detail with reference to certain exemplary embodiments thereof illustrated in the accompanying drawings which are given hereinbelow by way of illustration only, and thus are not limitative of the present invention, and wherein:

[0023] FIG. **1** is a view illustrating the operation of a conventional rotating tailgate mounted on the rear portion of a vehicle;

[0024] FIG. **2** is a side view illustrating a vehicle having a sliding tailgate according to one embodiment of the present invention mounted thereon;

[0025] FIG. **3**A is a view illustrating the configuration of the sliding tailgate according to one embodiment of the present invention;

[0026] FIG. **3**B is an internal view illustrating connection between a roof lever and a tilting unit of the sliding tailgate according to one embodiment of the present invention;

[0027] FIG. **3**C is an external view illustrating the connection between the roof lever and the tilting unit of the sliding tailgate according to one embodiment of the present invention;

[0028] FIG. **4** is an enlarged view illustrating the rear end of a moving main body of the sliding tailgate according to one embodiment of the present invention;

[0029] FIG. **5**A is a longitudinal-sectional view of a vehicle in a state in which the sliding tailgate according to one embodiment of the present invention is closed;

[0030] FIG. **5**B is a view illustrating the operation of the roof levers in the closed state of the sliding tailgate according to one embodiment of the present invention;

[0031] FIG. **5**C is an enlarged view illustrating the rear end of the moving main body in the closed state of the sliding tailgate according to one embodiment of the present invention;

[0032] FIG. **6**A is a longitudinal-sectional view of the vehicle in a state in which the sliding tailgate according to one embodiment of the present invention is tilted;

[0033] FIG. **6**B is a view illustrating the operation of the roof levers in the tilted state of the sliding tailgate according to one embodiment of the present invention;

[0034] FIG. **6**C is an enlarged view illustrating the rear end of the moving main body in the tilted state of the sliding tailgate according to one embodiment of the present invention;

[0035] FIG. **7**A is a longitudinal-sectional view of the vehicle in a state in which the sliding tailgate according to one embodiment of the present invention is opened;

[0036] FIG. **7**B is a view illustrating the operation of the roof levers in the opened state of the sliding tailgate according to one embodiment of the present invention; and

[0037] FIG. **7**C is an enlarged view illustrating the rear end of the moving main body in the opened state of the sliding tailgate according to one embodiment of the present invention.

[0038] It should be understood that the appended drawings are not necessarily to scale, presenting a somewhat simplified representation of various preferred features illustrative of the basic principles of the invention. The specific design features of embodiments of the present invention as disclosed herein, including, for example, specific dimensions, orientations, locations, and shapes will be determined in part by the particular intended application and use environment.

[0039] In the figures, reference numbers refer to the same or equivalent parts of embodiments of the present invention throughout the several figures of the drawing.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[0040] Hereinafter reference will be made in detail to various embodiments of the present invention, examples of which are illustrated in the accompanying drawings and described below. While the invention will be described in conjunction with exemplary embodiments, it will be understood that the present description is not intended to limit the invention to the exemplary embodiments. On the contrary, the invention is intended to cover not only the exemplary embodiments, but also various alternatives, modifications, equivalents and other embodiments, which may be included within the spirit and scope of the invention as defined by the appended claims.

[0041] Further, in the following description of the embodiments, it will be understood that the suffixes "part", "unit" and "main body" indicate units for processing at least one function or operation, and may be implemented using hardware or a combination between hardware and hardware.

[0042] In addition, in the following description of the embodiments, it will be understood that the term "tilting" of an element means a popped-up state of one end of a tailgate, and a tilted state includes the temporary shape or the continuous shape of the tailgate.

[0043] Furthermore, in the following description of the embodiments, it will be understood that the term "front portion" or "rear portion" as an expression in the moving direction of an element is used to distinguish the position of the element based on the length direction of a vehicle, and the direction is not limited in the description below.

[0044] Hereinafter, the embodiments of the present invention will be described in detail with reference to the accompanying drawings and, in the following description of the embodiments of the present invention, the same or similar elements will be denoted by the same reference numerals even though they are depicted in different drawings and a detailed description thereof will be omitted when it may make the subject matter of the present invention rather unclear.

[0045] FIG. **2** is a side view illustrating a vehicle having a sliding tailgate **100** according to one embodiment of the present invention mounted thereon, and FIGS. **3**A and **3**B are a view illustrating the configuration of the sliding tailgate **100** and an enlarged view illustrating connection relationships between elements thereof, respectively. FIG. **3**C is a view illustrating connection relationships between elements of a tilting unit **200**.

[0046] The sliding tailgate **100** according to embodiments of the present invention is located on at least a portion of the rear surface of a vehicle, and is configured to be automatically or manually opened in response to a signal from a user or the position of the user. In the illustrated embodiment, the

sliding tailgate **100** is located at the upper end of the rear surface of a vehicle, and is configured to be slidably moved towards the upper end of a roof.

[0047] The sliding tailgate **100** includes a moving main body **110** formed of glass or a panel and configured to face the rear surface of the vehicle, and roof levers **120** coupled to the moving main body **110** so as to tilt the front end of the moving main body **110** and configured to allow the tilted moving main body **110** to be moved along roof rail units **140** located on the roof of the vehicle.

[0048] The sliding tailgate **100** includes one or more roller units **160** provided on the moving main body **110** so as to move the moving main body **110** along rail units **130** formed on a vehicle body facing both side surfaces of the moving main body **110**, and drive units **300** configured to apply driving force to the roller units **160**. Further, the sliding tailgate **100** includes a controller **170** configured to apply the power of the drive units **300** to the sliding tailgate **100** so as to open the tailgate **100** when a user's opening signal or a predetermined electrical signal is applied.

[0049] The controller **170** rotates the drive units **300**, each of which is coupled to at least one roller of the roller unit **160**, so as to move the moving main body **110** along the rail units **130**. Further, the drive units **300** are located at both sides of the moving main body **110** so as to apply driving force to both sides of the moving main body **110**.

[0050] When the driving force of the drive unit **300** is applied in response to a signal first received by the controller **170**, the rear portion of the moving main body **110** is moved along the rail units **130**, and the front portion of the moving main body **110** is popped up in response to rotation of the roof levers **120**. More particularly, the driving force of the drive unit **300** is applied to the front portion of the moving main body **110** in the length direction of the moving main body **110**, and the applied driving force is applied to the roof levers **120** rotated about tilting units **200**. Therefore, each of the roof levers **120** is configured so as to be rotated about a corresponding tilting unit **200** provided between one end of the roof lever **120** and the roof rail unit **140**. That is, when the driving force is applied to the tailgate **100** in the closed state, the roof levers **120** are rotated so as to move the front portion of the moving main body **110** in the height direction of the vehicle, and thus, the tilted state of the front portion of the moving main body **110** is maintained.

[0051] The tilting unit **200** includes a guide part **210** located at one end of the roof lever **120**, a rotation guide part **220** configured to surround the guide part **210** so that the guide part **210** is rotated integrally with the roof lever **120**, and a deployment part **240** formed along the roof rail unit **140** and configured to extend through an opening **221** formed in one end of the rotation guide part **220** facing the roof rail unit **140**.

[0052] In one embodiment of the present invention, the guide part **210** is located inside the rotation guide part **220**, and is rotated about a central shaft **250** passing through the rear surface of the rotation guide part **220**. The guide part **210** may be formed in the shape of a rod which is rotated along the inner circumferential surface of the rotation guide part **220** having a cylindrical shape, and the rod may be provided integrally with the central shaft **250** of the rotation guide part **220** and thus be inserted into the deployment part **240**. Further, the central shaft **250** may be moved along a groove **150** formed corresponding to the deployment part **240** of a roof rail. In an embodiment of the present invention, the rod shape may include any structure having a rectangular cross-section having long sides **210***a* and short sides **210***b*.

[0053] That is, the guide part **210** formed in the shape of a rod is rotated along the inner surface of the rotation guide part **220** so as to convert the moving main body **110** into the tilted state. Therefore, in the popped-up state of the front portion of the moving main body **110**, the guide part **210** is rotated to a position corresponding to the opening **221** of the rotation guide part **220**. Thereafter, when the driving force of the drive unit **300** is applied, the guide part **210** is moved along the deployment part **240** connected to the opening **221** of the rotation guide part **220** so as to move the moving main body **110** towards the upper end of the roof.

[0054] As shown in FIGS. **3**B and **3**C, the guide part **210** is rotated along the inner circumferential surface of the cylindrical rotation guide part **220**. Further, the guide part **210** is rotated integrally with the roof lever **120** along the central shaft **250** passing through the rear surface of the rotation guide part **220**.

[0055] Further, as shown in FIG. **3**B, one end of the roof lever **120** is coupled to the moving main body **110**, and the guide part **210** is formed integrally with the other end of the roof lever **120**. The guide part **210** is formed in the shape of a rod, and is rotated about the central shaft **250** passing through the rear surface of the rotation guide part **220**.

[0056] In addition, as shown in FIG. **3**C, in the initially closed state of the moving main body **110**, the long sides **210***a* of the rod-shaped guide part **210** remain almost perpendicular to the opening **221** of the rotation guide part **220**, and thereby, the guide part **210** may be prevented from being moved to the roof rail unit **140** along the deployment part **240**.

[0057] Further, the moving main body **110** is configured such that the guide part **210** is preemptively rotated along the inner circumferential surface of the rotation guide part **220** based on an angular difference between the direction of the long sides **210***a* of the guide part **210** and the position of the opening **221** at an initial point in time when driving force is applied to the moving main body **110**. Therefore, the moving main body **110** is configured such that the front portion of the moving main body **110** is rotated upwards together with the roof levers **120** and thereby tilting of the front portion of the moving main body **110** is performed.

[0058] The tilted height of the moving main body **110** may vary depending on an angle formed by the openings **221** and the central lines of the guide parts **210** in the length direction, and moreover, be determined by the length of the roof levers **120**.

[0059] When the long sides **210***a* of the rod-shaped guide part **210** are rotated to a position corresponding to the opening **221** of the rotation guide part **220**, the guide part **210** is moved along the deployment part **240** of the roof rail unit **140**. The deployment part **240** is configured to have the same width as the short sides **210***b* of the guide part **210**, and thus limits the upward and downward movement of the guide part **210** and guides the movement of the guide part **210** in the length direction of the roof rail unit **140** when the guide part **210** is moved along the roof rail unit **140**. Further, the groove **150** formed in the roof rail unit **140** along the deployment part **240** is configured such that the central shaft **250** of the guide part **210** is moved along the groove **150**.

[0060] In one embodiment of the present invention, the deployment parts **240** limit the upward and downward movement or the rotational movement of the guide parts

210, each of which is located at one end of the corresponding one of the roof levers **120**, and thereby, the roof levers **120** maintain the state of being popped up from the upper surface of the roof and are moved in the length direction of the roof. That is, the roof levers **120** are rotated and moved, and thereby, the moving main body **110** maintains the tilted height thereof and is moved along the roof rail units **140**.

[0061] FIG. **4** is a view illustrating the drive unit **300** and the roller unit **160** located at the rear end of the moving main body **110** according to one embodiment of the present invention.

[0062] The sliding tailgate **100** includes the drive unit **300** which is located inside the moving main body **110**, receives a signal from the controller **170** and then provides driving force to the roller unit **160**. The drive unit **300** is configured to apply the driving force to at least one of a plurality of rollers of the roller unit **160**, and the rear end of the moving main body **110** is moved along the rail units **130** located inside the vehicle body by the roller units **160**, to which the driving force is applied.

[0063] In one embodiment of the present invention, the roller unit **160** includes two rollers which are provided at upper and lower positions, and the two rollers are configured to directly contact the upper and lower ends of the rail unit **130** so as to limit the upward and downward movement of the moving main body **110**. More particularly, the drive unit **300** may be configured to apply rotating force to one roller.

[0064] The drive units **300** may be located at both sides of the moving main body **110**, and provide the same driving force to the roller units **160** coupled to the rail units **130**. Further, the controller **170** may measure the movement distance of the roller units **160** moving along the rail units **130** or the current value of the drive units **300** and thus compensate for the rotating force of the drive units **300** based on the measured movement distance or the roller units **160** or the measured current value.

[0065] The drive units **300** are driven depending on the current value applied from the controller **170** in response to driving of the moving main body **110** input to the controller **170**, and the applied current value varies in the closed state, the tilted state and the opened state of the moving main body **110**. More particularly, the controller **170** may be configured to apply pulse current to the drive units **300**, and to control the number of frequency of applications of the pulse current and the application time of the pulse current.

[0066] As such, the drive units **300** are configured to apply rotating force to the roller units **160** protruding outwards from the moving main body **110**, and the roller units **160** are configured to be moved along the rail units **130** so as to switch the moving main body **110** from the closed state to the tilted state or the opened state.

[0067] FIG. **5**A is a longitudinal-sectional view of the vehicle in the state in which the moving main body **110** according to one embodiment of the present invention is closed, FIG. **5**B is a view illustrating connection relationships between the roof levers **120** and the roof rail units **140** in the closed state of the moving main body **110**, and FIG. **5**C is a view illustrating the rear end of the moving main body **110** including the drive units **300** in the closed state of the moving main body **110**.

[0068] When the moving main body **110** maintains the closed state, the upper surface of the moving main body **110** is substantially parallel to the roof. More particularly, the roof levers **120** are switched to a state of being substantially parallel to the roof.

[0069] Further, in the closed state of the moving main body **110**, the long sides **210***a* of the guide part **210** are located so as to be substantially perpendicular to the opening **221** of the rotation guide part **220**, and the roof levers **120** are located in a region in which a rotation regulation part **230** located at one end of the rotation guide part **220** and the guide part **210** contact each other. Therefore, the moving main body **110** is located to remain substantially parallel to the vehicle body.

[0070] FIGS. **6**A to **6**C are views illustrating the state in which the front end of the moving main body **110** is tilted.

[0071] As shown in FIG. **6**A, one end of the moving main body **110** adjacent to the roof of the vehicle is popped up in the height direction of the vehicle. Therefore, the front end of the moving main body **110** is popped up, and the rear end of the moving main body **110** is moved along the rail units **130** located on the side surfaces of the vehicle body so as to enable movement of the front portion of the moving main body **110**.

[0072] More particularly, when a request for tilting the moving main body **110** is input, the controller **170** applies current to the drive units **300**, and the roller units **160** coupled to the drive units **300** are rotated based on the applied current. The rotated roller units **160** are moved along the rail units **130**, which are located on the side surfaces of the vehicle body and contact the roller units **160**. Thereby, the long sides **210***a* of the guide parts **210** are rotated along the inner circumferential surfaces of the rotation guide parts **220** and one end of each of the roof levers **120** is popped up from the upper end of the roof, and thus, the front portion of the moving main body **110** integrally with the roof levers **120** is moved towards the upper end of the roof.

[0073] Each of the tilting units **200** includes the guide part **210** provided integrally with the other end of the roof lever **120**, the rotation guide part **220** connected to the roof rail unit **140** so that the guide part **210** is rotated therein, and the deployment part **240** formed along the roof rail unit **140** connected to the rotation guide part **220** and configured such that the guide part **210** is moved along the opening **221** of the rotation guide part **220** in the length direction of the roof rail unit **140**.

[0074] In one embodiment of the present invention, in the closed state of the moving main body **110**, the drive units **300** are driven so as to tilt the front end of the moving main body **110** and the guide parts **210**, each of which is located at the other end of a corresponding one of the roof levers **120**, are rotated inside the rotation guide parts **220**, and thereby, the front end of the moving main body **110** connected to ends of the roof levers **120** is moved integrally with the rotation of the roof levers **120**.

[0075] In FIG. **6**B, the rotation guide parts **220** are configured to rotate the corresponding ends of the roof levers **120** in the clockwise direction, and the front end of the moving main body no coupled to the ends of the roof levers **120** is rotated integrally with the movement of the roof levers **120**.

[0076] Here, the roof levers **120** are rotated to positions at which the long sides **210***a* of the guide parts **210** correspond to the deployment parts **240**, and thereby, the roof levers **120** may be located to be substantially perpendicular to the roof rail units **140**.

[0077] Further, the guide parts **210** include the central shafts **250** passing through the rear surfaces of the rotation guide parts **220**, and thereby, the guide parts **210** may be rotated simultaneously with the rotation of the roof levers **120** about the central shafts **250**.

[0078] When the guide parts **210** are connected to the deployment parts **240** and are thus inserted into the deployment parts **240**, the central shafts **250** may be moved integrally with the guide parts **210** along the grooves **150** formed in the roof rail units **140**. More particularly, the grooves **150** may be located substantially parallel to the roof rail units **140**.

[0079] The front portion of the moving main body **110** is tilted as the guide parts **210** are rotated, and the rotation regulation parts **230** configured to rotate the guide parts **210** to regions connected to the deployment parts **240** are formed inside the rotation guide parts **210**.

[0080] The rotation regulation part **230** is provided at one end of the rotation guide part **220** adjacent to the roof rail unit **140**, and may limit the amount of rotation of the guide part **210** so that the long sides **210***a* of the guide part **210** are rotated to a position corresponding to the length direction of the deployment part **240**.

[0081] More particularly, the rotation regulation part **230** may be configured to limit the amount of rotation of the guide part **210** so that the guide part **210** is rotated to a position corresponding to the opening **221** of the rotation guide part **220**, and determine the position of the guide part **210** in the tilted state so that the guide part **210** may be moved along the deployment part **240** in the length direction of the roof in the upright state of the roof lever **120** when additional driving force is applied from the drive unit **300**.

[0082] FIG. **7**A is a longitudinal-sectional view of the vehicle in the state in which the moving main body **110** is opened, and FIGS. **7**B and **7**C are views illustrating the coupling relationships between the roof levers **120** and the roof rail units **140** and the positions of the roller units **160** in the opened state of the moving main body **110**.

[0083] The moving main body **110** is switched to the opened state in response to input for opening the moving main body **110**, received by the controller **170**, and the controller **170** controls the drive units **300** so as to move the moving main body **110** towards the upper surface of the roof. The roof levers **120** in the tilted state, located at the front end of the moving main body **110**, are moved towards the front portion of the roof along the roof rail units **140**. More particularly, the guide parts **210** are moved along the deployment parts **240**, and the central shafts **250** of the guide parts **210** are moved towards the front end of the roof along the grooves **150** located in the roof rail units **140**.

[0084] That is, when the moving main body **110** is switched from the closed state to the opened state, the moving main body **110** is primarily switched to the tilted state, and then, the moving main body **110** is moved towards the upper surface of the roof along the roof rail units **140** while maintaining the popped-up state of the front end of the moving main body **110**.

[0085] Thereby, the moving main body **110** is switched from the tilted state to the opened state, and thus, the roof levers **120** are moved along the roof rail units **140**, and the roller units **160** located at the sides of the rear end of the moving main body **110** are moved to positions close to the rear end of the roof along the rail units **130** formed on the side surfaces of the vehicle body. The roof levers **120** are moved along the roof rail units **140** while maintaining a designated angle with the length direction of the deployment part **240**, and more particularly, are moved along the upper surface of the roof while maintaining an angle formed between the long sides **210***a* of the guide parts **210** and the roof levers **120**. Therefore, the front end of the moving main body **110** is moved in the length direction along the upper surface of the roof without interfering with the rear end of the roof in the length direction.

[0086] As is apparent from the above description, a sliding tailgate according to one embodiment of the present invention may exhibit the following effects through the above-described configuration and connection and usage relationships.

[0087] The sliding tailgate according to the embodiment of the present invention may be opened in a sliding manner even when there is no space behind a vehicle including the sliding tailgate, thereby being capable of improving efficiency of use of space.

[0088] Further, the sliding tailgate according to the embodiment of the present invention includes a moving main body, which is moved towards the upper end of the roof of the vehicle, thereby being capable of opening more widely.

[0089] The invention has been described in detail with reference to preferred embodiments thereof. However, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the appended claims and their equivalents.

What is claimed is:

1. A sliding tailgate comprising:

a moving main body configured to be located on at least a portion of a rear surface of a vehicle;

roof levers located at both side ends of a front portion of the moving main body and configured to be moved along roof rail units;

tilting units configured to rotate the roof levers so as to tilt the front portion of the moving main body;

rail units configured to be located on a vehicle body and coupled to roller units located at a rear end of the moving main body so as to provide a moving trajectory of the rear end of the moving main body;

drive units located on the moving main body and configured to apply a driving force to the roller units; and

a controller configured to receive a request for opening the moving main body and to control the drive units to apply the driving force to the roller units.

2. The sliding tailgate of claim **1**, wherein each of the tilting units comprises:

a guide part located at one end of a corresponding one of the roof levers and configured to be inserted into a corresponding one of the roof rail units;

a rotation guide part configured to surround at least a portion of an outer surface of the guide part so that the guide part is rotated integrally with the corresponding one of the roof levers; and

a deployment part configured such that the guide part is rotated to a position corresponding to the corresponding one of the roof rail units, is inserted into the corresponding one of the roof rail units, and is then moved along the corresponding one of the roof rail units.

3. The sliding tailgate of claim 2, wherein the guide part comprises a central shaft configured to pass through the rotation guide part, and wherein the central shaft is configured to be moved integrally with the guide part along a groove located parallel to the deployment part in the corresponding one of the roof rail units.

4. The sliding tailgate of claim 2, wherein the rotation guide part comprises a rotation regulation part configured to allow the guide part to be rotated to a position parallel to the deployment part.

5. The sliding tailgate of claim 1, wherein, when the driving force of the drive units is applied and the rear end of the moving main body is moved along the rail units, a front end of the moving main body is configured to be tilted by rotation of the roof levers about the tilting units.

6. The sliding tailgate of claim 5, wherein, after the front end of the moving main body is tilted, the roof levers are configured to be moved along the roof rail units.

7. A vehicle comprising:

a vehicle body including a roof;

roof rail units mounted on the roof of the vehicle body;

a tailgate panel located on at least a portion of a rear surface of the vehicle body;

roof levers located at both side ends of a front portion of the tailgate panel and configured to be moved along the roof rail units;

tilting units configured to rotate the roof levers so as to tilt the front portion of the tailgate panel;

rail units located on the vehicle body and coupled to roller units located at a rear end of the tailgate panel so as to provide a moving trajectory of the rear end of the tailgate panel;

drive units located on the tailgate panel and configured to apply a driving force to the roller units; and

a controller configured to receive a request for opening the tailgate panel and to control the drive units to apply the driving force to the roller units.

8. The vehicle of claim 7, wherein each of the tilting units comprises:

a guide part located at one end of a corresponding one of the roof levers and configured to be inserted into a corresponding one of the roof rail units;

a rotation guide part configured to surround at least a portion of an outer surface of the guide part so that the guide part is rotated integrally with the corresponding one of the roof levers; and

a deployment part configured such that the guide part is rotated to a position corresponding to the corresponding one of the roof rail units, is inserted into the corresponding one of the roof rail units, and is then moved along the corresponding one of the roof rail units.

9. The vehicle of claim 8, wherein the guide part comprises a central shaft configured to pass through the rotation guide part, and wherein the central shaft is configured to be moved integrally with the guide part along a groove located parallel to the deployment part in the corresponding one of the roof rail units.

10. The vehicle of claim 8, wherein the rotation guide part comprises a rotation regulation part configured to allow the guide part to be rotated to a position parallel to the deployment part.

11. The vehicle of claim 7, wherein, when the driving force of the drive units is applied and the rear end of the tailgate panel is moved along the rail units, a front end of the tailgate panel is configured to be tilted by rotation of the roof levers about the tilting units.

12. The vehicle of claim 11, wherein, after the front end of the tailgate panel is tilted, the roof levers are configured to be moved along the roof rail units.

13. A tailgate comprising:

a tailgate body configured to be located on at least a portion of a rear surface of a vehicle body;

rail units configured to be located on opposite sides of the rear surface of the vehicle body;

roof rail units configured to be located on opposite sides of a roof of the vehicle body;

roof levers located at opposite sides of an upper end of the tailgate body and configured to be moved along the roof rail units;

tilting units provided between the roof levers and the roof rail unit and configured to rotate the roof levers to tilt the upper end of the tailgate body;

roller units coupled to the rail units and configured to move along the rail units to provide a moving trajectory of a lower end of the tailgate body;

drive units located on the tailgate body and configured to apply a driving force to the roller units; and

a controller configured to receive a request for opening the tailgate body and to control the drive units to apply the driving force to the roller units.

14. The tailgate of claim 13, wherein each of the tilting units comprises:

a guide part located at one end of a corresponding one of the roof levers and configured to be inserted into a corresponding one of the roof rail units;

a rotation guide part configured to surround at least a portion of an outer surface of the guide part so that the guide part is rotated integrally with the corresponding one of the roof levers; and

a deployment part configured such that the guide part is rotated to a position corresponding to the corresponding one of the roof rail units, is inserted into the corresponding one of the roof rail units, and is then moved along the corresponding one of the roof rail units.

15. The tailgate of claim 14, wherein the guide part comprises a central shaft configured to pass through the rotation guide part.

16. The tailgate of claim 15, wherein the central shaft is configured to be moved integrally with the guide part along a groove located parallel to the deployment part in the corresponding one of the roof rail units.

17. The tailgate of claim 14, wherein the guide part has a rod shape and the rotation guide part has a cylindrical shape, and wherein the guide part is provided integrally with a central shaft of the rotation guide part and is configured to be inserted into the deployment part.

18. The tailgate of claim 14, wherein the rotation guide part comprises a rotation regulation part configured to allow the guide part to be rotated to a position parallel to the deployment part.

19. The tailgate of claim 13, wherein, when the driving force of the drive units is applied and the lower end of the tailgate body is moved along the rail units, the upper end of the tailgate body is configured to be tilted by rotation of the roof levers about the tilting units.

20. The tailgate of claim **19**, wherein, after the upper end of the tailgate body is tilted, the roof levers are configured to be moved along the roof rail units.

* * * * *